1. Explain that when their clothes dry, the water is not boiling off. It is not hot enough for the water to boil.
2. Draw an arrow pointing at one of the 'top' particles. Explain that sometimes an individual particle will have been heated up enough to be able to move away from the rest of the liquid, and we say it has *evaporated*. It is more accurate to speak in terms of energy, but at this point students might not have learned about energy.
3. Draw a saucepan full of water. Draw bubbles throughout the liquid. Make these are different sizes, and ideally a different colour to make it clear that these are not particles. Explain that boiling and evaporation are similar – they are both a liquid turning to gas – but that boiling happens throughout the whole liquid and only happens at or above the boiling point, whereas evaporation can happen below the boiling point, and only happens on the surface.

Check for understanding

Display the *CFU* slide and, using MWBs, ask questions like the ones below.

- How are boiling and evaporation different? *Reference to boiling and evaporation are needed.*
- How are boiling and evaporation similar? *Do not accept 'water to steam', or other specific examples.*
- Where does evaporation happen? *Look out for spatial answers, such as 'outside' or 'when it is sunny', which may arise because of the everyday examples given so far.*
- Does a substance have to be at the boiling point for evaporation to take place? Why/why not?

Independent practice review

Student Practice Book questions 32–34 (pages 43–44).

Q	Notes
32	The key point here is that the water particles still exist, in the form of steam. Challenge any misconceptions that the water particles have been 'burned' or destroyed in any way. Students will likely consider that the water has boiled, but the water will have turned into a gas by both evaporation and boiling.
34	This refutation question challenges the misconception that the only way that a liquid turns into a gas is by boiling.

C1.4 Gas pressure

Students' learning objective: *I am learning about gas pressure so I can predict how different conditions affect gas pressure.*

This topic is not one students will have any familiarity of from KS2.

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Knowledge check

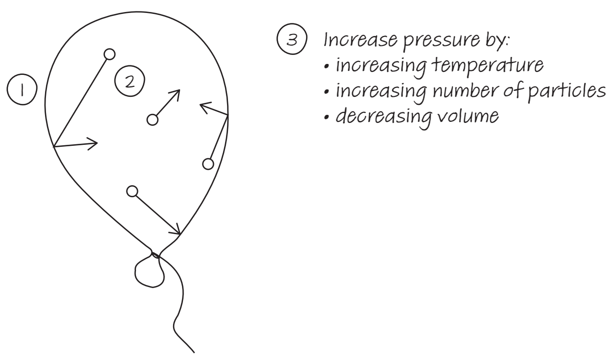
After working through the *General science quiz*, display the *Knowledge check* slide and, using MWBs, deliver the questions one by one, reteaching concepts as necessary.

	Question	Answer	Notes
1	In which state (or states) of matter can particles move freely?	Gases	Do not accept gases and liquids, because whilst the particles in liquids can move over one another, they cannot move freely – i.e. away from their neighbour.
2	In which state (or states) of matter are particles touching?	Solids and liquids	Accept either order.
3	What happens to particles when you heat them up?	They move faster	Do not accept 'change state' – it is the whole substance that changes state, not individual particles
4a	Which state (or states) of matter fill their containers?	Gas	Liquids take the shape of their container, but do not fill it.
4b	Explain your answer to the previous question.	Particles in gases move very fast and have overcome the forces holding them close to their neighbour, so can travel everywhere in their container	

Guided explanation

What is gas pressure?

Draw a diagram of a foil balloon with gas particles inside, as shown below. As you construct the diagram, accompany it with an explanation, similar to the one that follows.



1 Remind students that the particles in a gas move randomly and in all directions.

2 Add some arrows to the particles to demonstrate motion. Tell students that this means they will eventually hit the surface of the container. Continue adding arrows that collide with the balloon. Tell students that we say these particles have *collided* with the surface of the container, and when they hit (collide with) the container, they push against it a little bit. We call this pushing from these collisions *pressure*. At this point students have not learned about forces, so using the language of 'pushing' allows students to understand the concept, without being confused about what a force actually is. Forces are described as a push or a pull, so using the word push does not risk embedding misconceptions.

3 Explain that we can change the pressure. Remind students that pressure is caused by particles colliding with the surface of a container, so if we want to increase the pressure we need to increase the number of collisions, or how hard those collisions are. Tell students that there are three ways of doing this – heat it up, add more particles or make the space smaller.

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For some groups, you will be able to take suggestions for why each of those things increases the pressure, but for other groups, you will need to explain how each of those things increases the number of collisions:

- Explain that if we heat up the particles they move faster. Then explain that this means they will collide with the surface more frequently (there is no need to get into discussions around energy at this point).
- Explain that adding more particles means there will be more collisions. You may want to add more particles to your diagram to illustrate this.
- Explain that making the volume smaller means the particles will collide with the sides more frequently as well. You may want to draw a smaller foil balloon with the same number of particles to illustrate this.

Check for understanding

Display the *CFU* slide and, using MWBs, ask questions like the ones below.

- What are the three ways to increase the pressure? *Accept any order.*
- What will happen if … e.g. I reduce the number of particles/cool the space down/make the space larger? *Be careful to ask questions about how to both increase and decrease the pressure.*

Independent practice review

Student Practice Book questions 35–44 (page 44).

Q	Notes
37, 38	This is a key question for students to demonstrate understanding because it links the ideas of speed of particle movement changing with temperature and pressure. It is also phrased in reverse compared with explanations that are in the context of increasing pressure, with this relating to a decrease in pressure.
41	See page 55 for an explanation of how to implement *Because-But-So* activities. **a** If a gas is heated up, the particles … [move faster] because … [they have more energy]. **b** If a gas is heated up, the particles … [move faster] but … [do not change size or mass]. **c** If a gas is heated up, the particles … [move faster] so … [the pressure increases]. **d** If a gas is heated up, the pressure … [increases] because … [the number of collisions with the container increases]. **e** If a gas is heated up, the pressure … [increases] but … [the number of particles inside the container is the same]. **f** If a gas is heated up, the pressure … [increases] so … [the container may break if the pressure becomes too high]. **g** If a gas is cooled down … [the pressure decreases because the particles move slower and have fewer collisions with their container].
43–44	These are real-world applications of gas pressure and a useful opportunity to check that students understand the dangers of pressurised gas containers.